no vacuum can be formed; the pressure will depend only on the height of the column of water above the screw; the limiting velocity will be less than when the screw remained free from air.

The steering of screw steamers is dealt with in several papers laid before the British Association; three of these are reports of a committee appointed in 1875 to investigate the question. Of this committee Prof. Reynolds was secretary. Briefly, their researches confirm the theory he had advanced in a paper published in the *Engineer*, June 4, 1875, explaining the accident to the steamer *Bessemer*, which had failed to enter Calais Harbour on May 8 previously.

Prof. Reynolds pointed out

"when a ship is stopping, the water will be following her stern relatively faster than when she is moving uniformly, and consequently that the effect on the rudder will be diminished; that the longer the ship the greater will be this difference; also that this effect is greatly increased when a ship is stopping herself with her propellers, as was the *Bessemer*, for since not only is the retardation of the vessel much more rapid, but the water has a forward motion imparted to it by the propellers, which motion, if the propellers are near the rudder, may be greater than that of the ship, in which circumstance the effect of her rudder's action will be reversed."

In the paper on the radiometer, "On the Forces caused by Evaporation from, and Condensation at, a Surface," the true explanation of its action is given in the concluding paragraphs. The paper deals in the main with the effects of evaporation and condensation in causing motion, but near the end the author writes:

"Since writing the above paper, it has occurred to me that, according to the kinetic theory, a somewhat similar effect to that of evaporation must result whenever heat is communicated from a hot surface to a gas. The particles which impinge on the surface will rebound with a greater velocity than that with which they approached, and consequently the effect of the blow must be greater than it would have been had the surface been of the same temperature as the gas."

The longest paper in the collection is that on certain dimensional properties of matter in the gaseous state; it contains the results of a number of experiments on the thermal transpiration of gases through porous plates, and an extension of the dynamical theory to account for the phenomena.

Enough has been said, perhaps, to show the interest of the volume and the importance of the scientific results it contains. It is got up in the admirable manner which characterises the Pitt Press productions, and in form leaves nothing to be desired.

COUNT SCHEIBLER'S SPORTING TOUR.

Sette Anni di Caccia Grossa é Note di Viaggio in America, Asia, Africa, Europa. By Count Felice Scheibler. Pp. xv + 525. Illustrated. (Milan: U. Hoepli, 1900.)

ENGLISHMEN are, perhaps, somewhat too inclined to believe that great game shooting is a special prerogative of the Anglo-Saxon; but the publication of the present work, together with the recently issued English translation of Count Potocki's "Sport in Somaliland," should do something to dissipate this mistaken notion. Count Felice Scheibler may, indeed, be said to be a "mighty hunter," and the frequent mention of his name in Mr. Rowland Ward's "Records of Big Game" will suffice to show that many of the animals that fell to his rifle have yielded trophies of more than usual size. As is indicated in the title of the volume before us, the author's seven years' hunting included experiences of the great game of all the four continents of the world although in Asia his travels were limited to India and Ceylon, and in America to the United States and the Dominion of Canada. A well written and well illustrated record of such extensive experiences could not fail to be of interest, not only to his brother sportsmen, but likewise to naturalists; and the present volume may be truthfully said to fulfil both these conditions. The 250 text-figures with which the work is embellished are for the most part reproductions from photographs taken respectively by the author, Prince di Teano, and Mr. Seton Karr, and are remarkable alike for the manner in which they have been executed and the care with which they have been printed. A large number of these illustrations deal with animals which were shot by the Count, and although most of these were taken after death, yet they frequently portray very clearly some of the more striking characteristics of the particular species. The views of scenery and hunting scenes are, moreover, specially good, and will give to stay-at-home readers an excellent idea of the nature of the districts in which sport was obtained, and of the mode in which various animals are hunted. Of especial interest is the photograph, on p. 176, of recently captured elephants crowded into a *kedda*, while those representing the elephant tamers at work are scarcely less attractive. Some of the titles to the illustrations, such as "Il bufalo record," are perhaps a little comic, but Italian, like French, has not yet evolved a sporting language of its own.

Although the author does not appear to have had the good fortune to discover any new species, his accounts of the habits of many of the less known forms will be found of considerable interest to the naturalist. And a gratifying feature is the attention paid to nomenclature, since this is a point in which sporting works are apt to be very deficient. In the employment of names like *Mazama columbiana* for the Columbian black-tailed deer, and *Taurotragus oryx* for the eland, the Count is, indeed, thoroughly up-to-date and ahead of most works on popular natural history.

Whether, however, the author confined his love for shooting within such limits as would meet with the approval of the recent congress on the preservation of great game is a question which may be left for others to answer. But the plate on p. 457, which represents three individuals of the common African rhinoceros, out of a herd of six, already fallen, while aim is being taken by the author at a fourth, is calculated to give rise to misgivings on this point.

Starting from Liverpool in 1889, Count Scheibler sailed for America, where he soon enjoyed excellent sport in the Rocky Mountains with "grizzly" and wapiti; afterwards proceeding to British Columbia, where he was successful in obtaining examples of the Rocky Mountain goat. At San Francisco he embarked for India, where

his first experiences of sport were obtained in the fever-stricken Sandarbans of Lower Bengal. Proceeding northwards, he had the good fortune to be entertained by the Maharaja of Kuch-Behar, whose territories are now the finest sporting-grounds in India; and here he obtained, in addition to tiger, the large Indian rhinoceros, the gaur, and the wild buffalo. After a short sojourn in Gya and Ceylon, the party then crossed to Somaliland, which was at that time in its prime as a sporting country. From the Italian province of Erithræa the Count proceeded by sea to Zanzibar, whence he made a journey of considerable length into the interior of Equatorial Africa, obtaining specimens of Coke's hartebeest (*Bubalis cokei*), and the fringe-eared beisa (*Oryx callotis*). The final stage of the tour was Russia, where elk was added to the list of large game.

Although, as the author himself states, the work lays no claim to having advanced either zoological or geographical science, yet it may be commended as a very interesting account of types of animal life which are only too rapidly disappearing from the face of the earth. In fact, it is so interesting that there would seem a considerable probability that an English translation would be well received. R. L.

OUR BOOK SHELF.

Die Moderne Physiologische Psychologie in Deutschland. By W. Heinrich. Pp. iv + 249. (Zürich: Speidel, 1899.)

Zur Prinzipienfragen der Psychologie. By W. Heinrich. Pp. iv + 74. (Zürich: Speidel, 1899.)

An Outline Sketch, Psychology for Beginners. By Hiram M. Stanley. Pp. 44. (Chicago: The Open Court Publishing Company, 1899. London: Kegan Paul and Co., Ltd., 1899.)

MR. HEINRICH'S two little works demand careful study as well thought-out and consistent expositions of a psychological attitude which is in many ways attractive. The author, who may be described as a disciple of Avenarius *minus* his master's metaphysics, holds strongly the necessity of making the principle of psychophysical parallelism, understood in the most rigid sense, the basis of all psychological inquiry, and would consequently recognise no causes or causal laws other than those of the physical and physiological series. He has little difficulty in showing that Wundt and other contemporary writers, who, while professing the doctrine of parallelism, believe in causal sequences between psychical states as such, are inconsistent with their own professions. That the inconsistency can be avoided, or that an intelligible account of human life can be given in terms of purely physiological sequences, is scarcely so clear. As the author himself admits, it is a necessary consequence of his theory that the only difference between rational and purely reflex reaction on stimulus is one of comparative complexity. Whether an account of human life which reduces all activity to the purely reflex type is not like the play of *Hamlet* with the part of Hamlet left out, he does not discuss. The question is, however, directly suggested by his contention that, in treating of the behaviour of our fellow-men, we have no right to introduce the notion of consciousness, but should confine ourselves to establishing physical relations between changes in their environment and their corresponding outward reactions. He seems to forget that language, for instance, loses half its significance if you neglect to observe that it not merely can be understood by a listener, but is meant by the speaker to be understood. And even if we could agree to take no notice of consciousness in our fellows, it still remains, as the author admits, to examine the relation between the environment, which on his theory all science describes, and ourselves the describers. Thus all the problems about the relation between consciousness and its objects which Mr. Heinrich banishes from our psychological study of our fellows return upon us as soon as we attempt to understand our own relation to our environment. Perhaps the chief value of the author's discussions is that by his insistence on the too often disregarded consequences of the doctrine of parallelism, he compels his readers to ask themselves whether the old belief in the interaction of mind and body is not, with all its difficulties, more satisfactory than the fashionable substitute for it.

It is painful to turn from Mr. Heinrich's able and thoughtful work to such a piece of loose and unsatisfactory popular psychology as Mr. Stanley's essay. If psychology is to be taught in schools at all—in itself a debatable question—it ought, at least, to be taught in a precise and definite form. These scraps of inaccurate chatter are of no more value in psychology than they would be in elementary physics or in any other science. Read, for instance, the light and airy sentences (pp. 8-9) in which Mr. Stanley disposes of the difficult problem of space-perception. What would be thought of a writer on heat or chemistry who should evade all the puzzles of his subject by such loose and flimsy generalisation? In truth, the only way to treat work of this kind with kindness is to say nothing at all about it. The only words one can find in which to characterise it are that, like a good deal of popular writing on psychological topics, it is quite worthless, because the writer has set no serious standard of scientific accuracy before him.

Rural Wealth and Welfare: Economic Principles illustrated and applied in Farm Life. By Geo. T. Fairchild, LL.D. (New York: The Macmillan Company, 1900; London: Macmillan and Co., Ltd.)

THE scope of this treatise is perhaps more accurately indicated by its alternative title: it is primarily a text-book of economics, the concrete illustrations being taken preferably from objects and practices familiar to agriculturists. The book is accordingly addressed to this class of the community, though it may be doubted whether the ordinary farmer, at all events in this country, will be competent to make much practical use of the principles expounded. The position of farming, especially in the older civilised States, has perhaps undergone more change during the last thirty years than that of any other great industry, since it is practically within this period that the cultivator has had to learn to face the competition, not merely of his own countrymen, but of the whole world. It is therefore all the more necessary that he should be thoroughly acquainted with the modern conditions under which he has to work; in this respect, the remarks on the importance, as a factor in prices, of the increased facilities for marketing the enormous quantities of grain and other farm products raised in the United States, are very much to the point.

Lectures on Theoretical and Physical Chemistry. By J. H. van't Hoff. Translated by R. A. Lehfeldt. Part ii. Chemical Statics. Pp. 156. (London: E. Arnold.)

WE welcome the appearance of the English translation of the second part of van't Hoff's lectures. Dr. Lehfeldt has, as before, done his work admirably. It may be regretted, however, that he has adhered so closely to the somewhat uncouth structural formulæ used by the author. We venture to hope that in a future edition a freer use of brackets and points may be made, as the student might have some difficulty in recognising aceto-acetic ether in the formula $H_3CCOCH_2CO_2C_2H_5$.